Composting Association of Vermont
www.compostingvermont.org
Reclaiming Organics For Good

April 18, 2016

Padraic Monks
ANR/DEC, Stormwater Management Section
1 National Life Drive, Main 2,
Montpelier, VT 05620-3522

Dear Padraic,

Thank you for the opportunity to submit comments on the draft revisions to Vol I of the Stormwater Management Manual (VSMM).

The Composting Association of Vermont (CAV) values an approach to stormwater management that acknowledges the unknowns with climate change (as we are seeing at USEPA and USDOI), and the anticipated need for more water storage capacity. CAV supports the new Post Construction Soil Quality and Depth Standard as proposed in the draft revisions to VSMM – as a water quality protection practice, and as a climate change adaptation strategy.

Our comments on the revisions, recommendations for other practices and standards, and excerpts and links to relevant research are listed on the next four pages.

Given the likely learning curve for many practitioners (contractors, engineers, designers, etc.) to adopt soil-based Standard Treatment Practices (STPs), CAV also supports ANR led outreach and training for professionals affected by the revisions to the VSMM.

CAV is available to be a resource regarding the use of compost and compost products to comply with new rules for reducing stormwater volume and contaminants.

Thank you for considering our suggestions and recommendations to further revise the VSMM.

Sincerely,

Pat Sagui

Pat Sagui
Director

VSMM revisions submitted 041816 by Composting Association of Vermont

Post Construction Soil Quality and Depth Standard
Expand requirement to steeper slopes, greater than 3:1

Require the practice on solar array sites

Runoff Reduction STPs
Allow increase in SOM above 5% as STP to meet Runoff Reduction, Recharge, Water Quality, and Channel Protection Standards

Require the use of Compost Blankets to reestablish vegetation on embankments

Stormwater Hotspots
Add '*wind and solar energy generation sites'* to list of examples

Allow or require use of compost based BMPs for brownfields restoration

Disconnection to Filter Strips and Vegetated Buffers – Use of level spreaders
Allow compost products to be used for upstream sediment removal and to build level spreaders where revegetation and downstream bank stabilization would benefit from this practice.

Upper Elevation Energy Projects
Steep slopes present numerous challenges for the use of level spreaders. Below are excerpts from research at Villanova University that may be useful in developing stormwater management practices for steep slopes.
(Note: During the PSB's site visit to the Lowell Wind Project during construction, rilling was evident below two level spreaders in 'undisturbed' forest edge soils.)

https://www1.villanova.edu/content/dam/villanova/engineering/vcase/sym-presentations/2007/V_I_3.pdf

• It is imperative that the site selected for level spreader installment be nearly level before construction. Variations in existing ground elevation of more than 4 inches across the entire length of the level spreader can make "level" construction difficult.

• Soil slope: Gentle/gradual uniform slopes are ideal, with a maximum slope of 6% from level spreader to toe of slope (i.e. top of stream bank). The first 10 feet of buffer/vegetated filter strip down slope of the level spreader should not exceed 4% slope. For greater slopes or if construction of a level spreader can not be accomplished without clearing/removing down slope vegetation, the designer should not use a level spreader.

• Because of construction-related problems, the performance of level spreaders should be monitored for 2 years on a quarterly basis and semi-annually thereafter. Inspections should also follow rainfall events exceeding 1-inch.

• For the purposes described in this paper, level spreaders should be constructed to effectively diffuse anticipated flows up the 100-year storm. For this reason, these structures must be limited in their drainage areas. (5 acres maximum.) Level spreaders may be multi-functional and can incorporate both water quality treatment and infiltration as part of a treatment train – but **since these facilities are located at the tail end of the train, they should not be a primary BMP.**

Filter Media Composition
See excerpt of Rodale Study at end of comments. Given these breakthroughs in keeping P and N bound in compost, we ask ANR to work with a soil scientist knowledgeable in the development of Filter Media using materials available in VT.

Filtering Systems
Require or allow the use of Compost Filter Socks

Rooftop media
See excerpt of Rodale Study at end of comments. Given these breakthroughs in keeping P and N bound in the compost, we ask ANR to work with a soil scientist knowledgeable in the development of Rooftop Media using materials available in VT.

Rainwater Harvesting
Require treatment if runoff is from roof mounted solar panels.
http://water.usgs.gov/wrri/10grants/progress/2010TX360B.pdf

Renew mulch annually to specified depth in planting beds/rain gardens
Develop STPs for Maintenance component, including specifications for mulch material so sediment and nutrient trapping are part of the maintenance goal.

Additional Recommendations

• Allow/Require Compost Filter Sock as part of treatment train for trapping contaminants – eg. parking lot or street storm drain inlet. (This practice can also be used at inlets to agricultural field tile drains as interim practice until field soils are improved)

• Develop STPs for use of compost products for Pre-treatment.

• Provide Post Construction Soil Quality Guidelines per WA Soil BMP Manual.
This manual, specifications, and resources are available online at www.SoilsforSalmon.org with factsheets for builders at www.BuildingSoil.org

• Ban coal tar based asphalt sealants.
http://invw.org/2011/05/05/washington-is-first-state-in-nation-to-ban-toxic-pavement-sealants/

• Develop incentives and certification for exceeding Run-off Reduction and for Zero Discharge sites.
LEEDS Credits and Compost for North Carolina: http://www.filtrexx.com/wp-content/uploads/2014/08/Webinar-Slides_Filtrexx-for-LEED-GreenBuilding.pdf

http://carolinacompost.com/wp-content/uploads/2015/09/Going-Grey-to-Green-NCGBC-082715.pdf

• Add section for Solar Projects

- Given anticipated changes in the fabrication of solar panels, require soil health monitoring as a condition of CPG and build a data base of leaching contaminants.
- Require soils on solar array development sites be amended to increase soil organic matter to 5%.
- Develop stormwater management BMPs commensurate with the industrial toxins/heavy metals that can leach from solar panels. http://water.usgs.gov/wrri/10grants/progress/2010TX360B.pdf

Rodale Research on compost recipe development
Compost recipes that keep P better bound up, but still available for plant growth, could be useful to develop Bioretention Media specifications.

http://www.newfarm.org/depts/NFfield_trials/2006/0413/compost.shtml

The amendment mix is designed to accelerate biogeochemical processes involved in soil aggregation. The reaction uses calcium ions (Ca++) as mortar to electrochemically attract and bind negatively-charged clay and humic acid particles, generating soil aggregates (or clumps). Clumps of soil, clay, calcium and humic particles create the storage structures needed to bind nutrients, thus preventing their loss through leaching or volatilization. In this way, the nutrients are captured in stable forms that resist losses to water and air but are available over time to help plants grow and develop. Our data indicate that this particle-and-nutrient binding process can have multiple benefits, some which came as a surprise.

Now, as part of our PA DEP-funded grant, we are also answering the second question by composting plain manure and our two different compost mixes on concrete drainage pads designed to capture any water that runs through the compost pile. This approach allows us to precisely measure nutrients and bacteria that are washed out of the compost as the piles mature.

Our three compost recipes are: 1) a standard mix of three parts leaves and one part manure; 2) our new (patent pending) amended mix that incorporates 14 cubic yards of leaves, 4 cubic yards manure, 2 cubic yards clay (taken from our farm subsoil), 90 pounds of gypsum (calcium), and 110 pounds of humic acid (leonardite coal dust); and 3) a plain manure "compost" (no leaves or other carbon materials added, with the exception of minimal bedding materials), which represents a worst-management scenario.

Poultry manure (broiler litter) was used as the nitrogen source for the first round of compost in this study, which was initiated in May and finished in October of 2005. Data from the first part of the trial showed that, under slightly-lower-than-normal precipitation, the poultry manure (alone) leached 70 percent more ammonium nitrogen and 25 percent more ortho-phosphate (ortho-P) than standard composted manure. But when reported in actual weight, these nutrient losses were quite small; even the manure alone leached only 2.4 ounces of ammonium N and 1.4 ounces of ortho-P from a 20-cubic yard pile.

Downpour reveals big differences
However, after an extreme precipitation event in October—during which the farm received 10 inches of rain in two days—the manure-only pile lost 95 percent more ammonium N and ortho-P than either of the other composts. And the weight of the nutrients lost was more alarming: The manure-alone pile lost 18.3 pounds of ammonium N and 74 pounds of ortho-P, while the standard compost lost only 18.2 ounces of ammonium N and 49.9 ounces (3.1 pounds) of ortho-P. These results clearly show that, to prevent nutrient loss, standard compost is a superior way to manage manure waste and apply its nutrients to the field—far better than piling and applying manure by itself.

But our specially amended compost performed even better. During the summer period with lower rainfall, the amended compost lost 85 percent less ammonium N than the standard compost (only 0.11 ounces) and 71 percent less ortho-P (0.32 ounces). And after the extreme rain event, the amended compost leached the same amount of ammonium N as the standard compost (19.4 ounces) and 39 percent less ortho-P (30.56 ounces, or 1.91 pounds).

This data demonstrates that the amended compost is a significant improvement over the standard compost recipes of old. We are currently performing a second round of compost-pad studies—using dairy manure as the nitrogen source for the compost—to corroborate our initial test. Thus far, the dairy manure has shown

results consistent with broiler litter, with a large and clear advantage for amendments, including less leaching and even faster processing. Dairy manure also seems to offer more rapid and complete composting than broiler litter.

During the coming 2006 growing season, we will apply both the dairy- and poultry-manure-based composts, along with raw dairy and poultry manure and chemical fertilizer, to corn fields fitted with lysimeters to see if the amended composts hold nutrients as well in the field as they do in the pile. We also incorporated the composts into potting mixes that we're using to grow lettuce and test the composts' influence on plant growth and nutrient content in the greenhouse.

The development of the clay-calcium-humic acid compost amendment tests the theory of soil organic matter stabilization and soil aggregation proposed by Frank Stevenson, PhD, at the University of Illinois.

New recipe shows some surprise benefits

The amendment mix is designed to accelerate biogeochemical processes involved in soil aggregation. The reaction uses calcium ions (Ca++) as mortar to electrochemically attract and bind negatively-charged clay and humic acid particles, generating soil aggregates (or clumps). Clumps of soil, clay, calcium and humic particles create the storage structures needed to bind nutrients, thus preventing their loss through leaching or volatilization. In this way, the nutrients are captured in stable forms that resist losses to water and air but are available over time to help plants grow and develop. Our data indicate that this particle-and-nutrient binding process can have multiple benefits, some which came as a surprise.

First, our amendments trapped odors much more effectively than we expected. Amended compost cut the odors from the poultry manure within 10 days; more quickly than standard compost (long recognized for its ability to reduce odors), which took six weeks. Thus, the amendments could allow composters to work in urban environments without offending the neighborhood.

Second, we found that the amended compost aggregated (clumped) conclusively within its first 10 days, again more quickly than we had hoped.

Third, the more stable N in the amended compost provided little food to support bacteria such as the E. coli pathogen (found in manure). Thus, E. coli was eliminated from the water that ran off the amended compost pile after only six weeks. The standard compost eliminated the E. coli by 12 weeks, and the poultry manure alone still leached it after six months (and probably still leaches it at the time of this writing). This data suggest that compost, particularly the amended compost, can go a long way to reduce potential pathogens, as well as excess nutrients, in the water supply.

Fourth, the E.coli was eliminated by immobilization of organic nitrogen, rather than by pile temperature. We allowed pile temperatures to settle close to ambient temperature before turning and actually turned the piles only three times over their six months on the pads. Our goal in turning less often was to reduce N volatilization, but the reduced work load and elimination of E. coli are equally important benefits.

Fifth, because the amendment mix reduced nitrogen losses from the pile, N:P ratios were higher in the amended compost than in the standard compost or plain manure. This fact has very positive implications for field application, because higher N:P ratios allow farmers to apply more compost to satisfy a crop's N requirement without over-applying P (which is usually over-abundant in our local soils).

Finally, the amended compost was "finished" about 12 weeks earlier than the standard compost, based on temperature and soluble salt measurements (the manure-only pile is still far from being finished). The amendments yielded a light, well-crumbled mixture that made a lovely potting mix (a bit more uniform in texture than the standard compost) and that is easier to apply due to drier texture and granulation.